



This document contains the Summary, Indicator Development Checklist, and References for the Indicator Development for Estuaries report. EPA-842-B-07-004. The remainder of the document can be downloaded from:
<http://www.epa.gov/owow/estuaries/indicators/>

Indicator Development for Estuaries

February 2008

SUMMARY

Since the 1960s, the necessity of preserving and protecting our nation's coastal waters has been recognized. The nation has worked diligently to enact legislation (the CWA and CZMA) and develop programs (*e.g.*, NEPs and the NERR system) and initiatives to protect our coastal environment. As a result, plans and environmental assessment programs have been developed to prevent further degradation and address ways to improve ecosystems.

In 1993, GRPA called for "Federal agencies to undertake efforts to measure their performance and the effectiveness of their programs" (The Heinz Center, 2003). In response, a series of indicators were developed that could track the effectiveness of these programs and provide quantifiable measures that demonstrate the response of our nation's coastal waters. Since the enactment of GPRA, programs such as EPA's NCA have been implemented to measure improvement of coastal estuaries nationwide.

In support of programs and initiatives focused on preserving, protecting, restoring, and improving estuaries, EPA has developed this "Indicator Development for Estuaries" manual to help further those efforts. As previously stated, the intent of this manual is to provide an interactive process, considerations, and lessons learned to assist coastal and estuarine programs, including the NEPs, in ecological and environmental indicator development on a local, regional, or national level.

To summarize this manual and provide assistance to programs, the following checklist is provided as a supporting tool for indicator development, covering the important areas of program planning through implementation and reassessment. Additionally, three case studies have been included in Appendix A to demonstrate how local and regional programs have conducted their indicator development process.

Finally, Appendices B and C are included as supplemental information to assist programs with their indicator development. Appendix B lists some of the indicators chosen by various programs, including NEPs. Appendix C lists some available resources on indicator development. This list is not meant to be all inclusive, but rather a sampling of available documents.

INDICATOR DEVELOPMENT CHECKLIST	
Check Box	Steps/Considerations
	Program Planning (unless already conducted as part of the estuaries CCMP development)
	<ul style="list-style-type: none"> Decide on the spatial scale of the program
	<ul style="list-style-type: none"> Convene a steering committee
	<ul style="list-style-type: none"> Reach agreement or consensus on the purpose and need for indicators
	<ul style="list-style-type: none"> Identify the key issues
	<ul style="list-style-type: none"> Develop management objectives
	<ul style="list-style-type: none"> Define questions to be answered by indicators
	<ul style="list-style-type: none"> Conduct baseline assessment on each issue
	Conceptual Models Development
	<ul style="list-style-type: none"> Determine the type of conceptual model to use
	<ul style="list-style-type: none"> Develop conceptual models for each issue
	Indicator Specification
	<ul style="list-style-type: none"> Collect information on monitoring programs being conducted in the area (<i>e.g.</i>, who, what, where, when, how often, using what methods)
	<ul style="list-style-type: none"> Determine how indicators should be selected (<i>e.g.</i>, based on parameters already being monitored; scientifically sound parameters)
	<ul style="list-style-type: none"> Develop possible indicators list
	<ul style="list-style-type: none"> Select indicators to answer key questions based on the following criteria: <ul style="list-style-type: none"> Conceptual relevance/soundness—<i>Is the indicator relevant to the assessment question and to the resource at risk? Scientifically sound?</i> Feasibility of implementation (current and future)—<i>Are the methods for long-term sampling and measuring the environmental variables technically feasible, appropriate, and efficient for monitoring use?</i> Response variability—<i>Are human errors of measurement and natural variability over time and space sufficiently understood and documented?</i> Interpretation and utility—<i>Will the indicator convey information on resource conditions that is meaningful to environmental decision-makers? Is the indicator currently monitored and likely to be monitored in the future? Sustainable indicators.</i>
	Monitoring Plan Development and Modification
	<ul style="list-style-type: none"> Develop or revise current monitoring plan to incorporate selected indicators
	<ul style="list-style-type: none"> Identify indicators critical to the evaluation of monitoring program performance
	<ul style="list-style-type: none"> Design and implement data management plan

INDICATOR DEVELOPMENT CHECKLIST (Continued)	
Check Box	Steps/Considerations
	Indicator Implementation
	<ul style="list-style-type: none"> Formally adopt program
	<ul style="list-style-type: none"> Obtain funding
	<ul style="list-style-type: none"> Initiate communication among organizations
	<ul style="list-style-type: none"> Convene an implementation oversight committee
	<ul style="list-style-type: none"> Develop a data analysis and assessment plan
	<ul style="list-style-type: none"> Implement the monitoring plan
	<ul style="list-style-type: none"> Report indicator findings
	Indicator Reassessment
	<ul style="list-style-type: none"> Reassess selected indicators a minimum of every 5 years

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